

## Final Report

Grant Title: Temporal and Spectral Variations of 2S 0921-630 and LMC X-2

Grant Number: NAG8-1035

Reporting Period: February 11, 1994 - February 10, 1996

Principal Investigator: Paul C. Schmidtke

Institution: Arizona State University, Tempe, AZ 85287

The goal of this study is to use data from the Ginga archive to study the variability of X-ray emission from low-mass X-ray binaries (LMXBs). Most of our effort has been directed towards an investigation of 2S 0921-630. Only limited data are available on a similar X-ray source called LMC X-2. Since these targets are members of the very small subclass of LMXBs having long orbital periods, a comparison will be made with the much more common short-period LMXBs.

With the assistance of Dr. Kazumi Asai at ISAS, the X-ray light curve of an eclipse of 2S 0921-630 (observed in May 1989) has been extracted from the Ginga archive. The time of mid-eclipse and its duration agree with the prediction based on two X-ray eclipses recorded with the EXOSAT satellite in 1983 and 1985. (These were the only X-ray eclipses of 2S 0921-630 observed prior to Ginga). Optical photometry that we have obtained during 1988-1994 confirms the 9-day orbital period for this system and refutes a 13-day periodicity proposed by some ground-based observers.

The Ginga data show that the depth of eclipse is greater at higher energies, implying a vertical temperature structure to the X-ray emission region that is consistent with an Accretion Disk Corona (ADC) model. In an ADC model the X-rays seen during eclipse come from cool material that is high above the accretion disk.

Finally, we note that for the highest X-ray energies recorded by Ginga, the eclipse light curve is subject to large systematic errors in background subtraction. Hence, the investigation is restricted to X-rays with energies below about 14-15 keV. This problem of background subtraction also affects the determination of short time scale variability since the satellite operated in a low-altitude orbit. Verification of our choice of background is in progress and must be completed before we can make a definite statement regarding these high-frequency variations. After this problem is solved, our results will be submitted for publication.